

Visual measurements of plasma arc modes in a high-current vacuum arc with an axial magnetic field

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Abstract—The use of high-speed cameras to record the optical light emissions from arcing on electrical contacts provided valuable information on the behavior and mode of the vacuum arc. In many previous visualization experiments on vacuum arcs, particularly when a bright arc core appeared at high currents, the light emissions saturated the camera system. This obscured both the details of the arc and the transition point between arc modes. Furthermore, the use of film cameras in many experiments made it difficult to numerically analyze the images, and often resulted in subjective definitions of the various arc modes. Experiments using a digital imaging system where the light intensity was limited to the dynamic range of the camera provided significant information on the behavior of vacuum arcs on Cu-Cr contacts in an axial magnetic field (AMF). This work focused on qualitatively analyzing the light emissions from the bright arc core that appeared at high currents, both parallel to the contacts and along the contact gap. The use of arc light intensity allowed for a more concrete identification of the transition point between arc modes.

Keywords - vacuum arc, axial magnetic field, arc visualization, Cu-Cr